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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/450,351	11/29/1999	TOMOE YAMAMOTO	SHM-00901	7516

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HUTCHINS, WHEELER & DITTMAR
101 FEDERAL STREET
BOSTON, MA 02110

EXAMINER

TSAI, H JEY

ART UNIT PAPER NUMBER

2812

DATE MAILED: 04/12/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/450,351

Applicant(s)

YAMAMOTO, TOMOE

Examiner

H. Jey Tsai

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 1/8/02, 1/15/02.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 13-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 13-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 19.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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Claim Rejections - 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-11 and 13-36 stand rejected under 35 U.S.C. 103(a) as being unpatentable over DeBoer et al. 6,146,959 or Huang 6,057,189, all are newly cited, in view of Tamaru et al. 6,103,566, or Nishikawa 6,087,261 or Lee et al. 6,010,940, all are previously applied.

The reference(s) teach the features :

DeBoer et al. substantially discloses a method of forming a capacitor on the semiconductor device, which includes :

forming a tantalum oxide dielectric layer 38, fig. 2+,

treating substrate in the chamber with at least one of a gas containing non-reactive NF₃ or hydrazine gas and NH₃, col. 4, lines 29+,

forming a CVD TiN film 42 over dielectric layer 38.

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Huang substantially discloses a method of forming a capacitor on the semiconductor device, which includes :

forming a tantalum oxide dielectric layer 36, fig. 2C+,
treating substrate with non-reactive nitrogen gas , col. 4,
lines 47+,

forming a CVD TiN film 38 over dielectric layer 38.

Tamaru et al. substantially discloses a method of forming a capacitor on the semiconductor device, which includes :

forming a tantalum oxide dielectric layer 5, fig. 4B, and
col. 16, lines 7+,

treating substrate in the chamber with at least one of a
gas containing non-reactive helium or Ar or N₂ gas and NH₃,

heating the substrate in the NH₃ col. 9, lines 44+.

forming a TiN film over the dielectric layer 5.

Nishikawa substantially discloses a method of forming a capacitor on the semiconductor device, which includes :

forming a tantalum oxide dielectric layer 5, fig. 4B,

treating substrate in the chamber with at least one of a
gas containing non-reactive NH₃ and helium gases flow, col. 9,
lines 1+,

heating the substrate in the NH₃ ambient at about 0.15 torr,
fig. 6, col. 9, lines 30+,

forming a TiN film over the dielectric layer 5.

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Since, Tamaru, Nishikawa and Lee et al. teach details of forming a CVD TiN. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have using Tamaru, Nishikawa and Lee et al.'s CVD TiN process to form a TiN film over dielectric layer

Applicant's arguments filed Jan. 15 2002 and Jan. 8, 2002 have been fully considered but they are not persuasive. Because Sandhu and Huang clearly teach heating the dielectric layer with non-reactive gas as set forth above.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated

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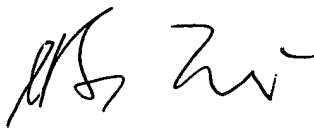
from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry of a general nature or clerical matters or relating to the status of this application or proceeding should be directed to the Group customer service whose telephone number is (703) 306-3329 and Fax number (703) 306-5515. Group receptionist telephone number 703-308-0956.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to H. Jey Tsai whose telephone number is (703) 308-1374. The examiner can normally be reached on from 7:00 Am to 4:00 Pm., Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone number for this Group is (703) 308-7722.

hjt
4/9/02



H. Jey Tsai
Primary Examiner
Patent Examining Group 2800